

Course Title: Control Engineering
Date: 3-12 -2015 (Mid term exam)Course Code: CCE3115
Allowed time: 1.5 hrsYear: 3rd
No. of Pages: (1)**Problem number (1) (5 Marks)**

A unity feedback control system has an open loop T.F as follows:

$$GH(S) = \frac{0.5(1 + \frac{S}{1})(1 + \frac{S}{10})}{S(1 + \frac{S}{5})(1 + \frac{S}{50})^2}$$

- (i) Sketch the bode diagram for the system
- (ii) Determine the gain margin (GM), phase margin (PM), the phase crossover frequency (ω_{pc}), the gain crossover frequency (ω_{gc}).
- (iii) Check the system stability

Problem number (2) (5 Marks)

The open loop T.F of a system is given as :

$$GH(S) = \frac{K S}{(S^2 + 4)(S + 5)}$$

- (i) Sketch the root locus.
- (ii) Determine the range of K for system stability.

Problem number (3) (5 Marks)

A unity feedback control system has an open loop T.F as follows:

$$GH(S) = \frac{1}{(S + 0.5)(S + 2)(S + 1)}$$

- (i) Sketch the polar plot for the system .
- (ii) Determine the gain margin (GM), phase margin (PM), the phase crossover frequency (ω_{pc}), the gain crossover frequency (ω_{gc}).
- (iii) Check the system stability

Good luck

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